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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,888	04/12/2004	Akira Murotani	ASAM.0119	2499

7590 08/16/2005

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EXAMINER	
GU, SHAWN X	

ART UNIT	PAPER NUMBER
2189	

DATE MAILED: 08/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/821,888	MUROTANI ET AL.	
	Examiner	Art Unit	
	Shawn Gu	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,11 and 18* is/are rejected.

7)☒ Claim(s) *5-10 and 12-17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/12/04,4/27/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d).

2. Claims 1-18 are pending.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted on 12 April 2004 and 27 April 2005 were filed after the mailing date of the application on 12 April 2004. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

4. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 18 recites the limitation "said shared memory" in the disk control apparatus. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-4, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kern et al. [US 6,463,501 B1], further in view of Cheston et al [US 6,195,695 B1].

8. As to claims 1 and 11, Kern et al. teaches a disk control apparatus (Figure 1, Primary Control Unit 4, Secondary Control Unit 20, System Data Mover 30, Cache 10; and Figure 2, System Clock 66) and a control method for such apparatus, wherein the disk control apparatus is connected to an information processing apparatus (Figure 1, Host 6) so as to be able to communicate with the information processing apparatus,

the disk control apparatus writing/reading data into/from (Column 4, Lines 7-11; Column 4, Lines 30-33; Column 4, Lines 47-49) a first storage device (Figure 1, Primary DASD 8) having one or more logical volumes formed thereon (Column 4, Lines 13-14),

a second storage device (Figure 1, Secondary DASD 22) having one or more logical volumes formed thereon (Column 4, Lines 13-15), and

a third storage device (Figure 1, combination of Journal 26 and Master Data Set 28; Column 4, Lines 60-61, the journal data sets resides on an device other than the first and second storage devices),

the disk control apparatus comprising:

a memory (Column 4, Lines 43-44, the System Data Mover software maintained at Primary Control Unit 4 or Secondary Control Unit 20 implies a memory in the disk control apparatus), association of identifiers of the logical volumes in said first storage device serving as identifiers of primary logical volumes with identifiers of the logical volumes in said second storage device serving as identifiers of secondary logical volumes (Column 4 Lines 13-19, volume pair) being stored in said memory (since the System Data Mover software manages the backup of data from primary DASD to secondary DASD, Column 4, Lines 29-35; the volume pairs which provide the association between the primary and secondary volumes must be used by the System Data Mover in backing up of data, and it would have been obvious to one ordinarily skilled in the art at the time of the applicant's invention that storing the volume pairs on the same memory with the System Data Mover would provide faster access and operation time than storing the volume pairs elsewhere) as a pair management table (a volume pair is inherently a pair management table with one row and two columns, or with one column and two rows)

a timing mechanism (Figure 2, System Clock 66);

a write request reception unit (Figure 1, Primary Control Unit 4) for receiving a write request of data for a logical volume in said first storage device and the data to be written, from the information processing apparatus (Column 4, Lines 7-22);

a first write unit responsive to reception of the write request, for writing the data into the logical volume in said first storage device (Column 4, Lines 7-22; destaging the said write data maintained in cache 10 to DASD 8 suggests a first write unit);

a journal write unit (Figure 1, System Data Mover 30) for writing journal data (Figure 1, combination of Journal 26 and Master Data Set 28) into said third storage device (Column 4, Lines 47-49; Column 6, Lines 20-27), the journal data comprising an identifier of the logical volume in said first storage device into which the data has been written (Column 4, Lines 49-53; for the order of volume updates in a consistency group to be preserved in the journal, the identifiers of the volumes must be included to enable such ordering, it is further needed to form a consistency group of updates to volumes that share a session), information of a location in which the data is stored in the logical volume (Column 4, Lines 17-22; for the secondary DASD 22 to maintain a consistent and concurrent image of the primary DASD 8, the location in which the data is stored in the primary volume must be included in the journal data which contains the volume updates that are in turn applied to the secondary volumes, Column 5, Lines 36-39), update time which is current time acquired from said timing mechanism (Column 6, Lines 24-27), and the data (data updates, Column 4, Lines 48-49); and

a second write unit (Column 7, Lines 61-64; the System Data Mover applying the update from the Journal to the corresponding Secondary DASD suggests that there is a second write unit) for referring to an identifier of the logical volume in the journal data (Column 4, Lines 13-22; Column 7, Lines 15-18; applying an update in the primary volume of a volume pair to the corresponding secondary volume of the volume pair requires that the identifier of the volume to be referred to), the location information (Column 4, Lines 17-22; for the secondary DASD 22 to maintain a consistent and concurrent image of the primary DASD 8, the location information contained in the

journal data must be referred to) and the data in the journal data, acquiring an identifier of a secondary logical volume having the identifier of the logical volume as an identifier of the primary logical volume from the pair management table (Column 7, Lines 15-18; Column 4, Lines 13-22) and writing the data into a place indicated by the location information, in the logical volume indicated by the identifier of the secondary logical volume, in said second storage device.

Although Kern et al. does not teach a second write unit that refers to the update time of the journal data stored in said third storage device, and selects journal data for which a difference between current time acquired from said timing mechanism and the update time is longer than a predetermined time, the reference does teach that journal data are arranged into consistency groups based on update time before being written into the secondary storage device in order to preserve the order of updates and ensure consistency (Column 5, Lines 44-45; Column 6, Lines 20-25). Cheston et al. teaches a data storage system where a backup copy of the data is updated when a difference between current time and the update time is longer than a predetermined time (Column 2, Lines 62-63; Column 3, Lines 9-13; Column 4, Lines 34-38). The purpose for this mechanism is to ensure the consistency of the backup (Column 3, Lines 9-13). Therefore, it would have been obvious to one ordinarily skilled in the art at the time of the applicant's invention that Cheston et al.'s teaching of periodic backup of updates can be included in Kern et al.'s disk control apparatus, in order to ensure the consistency of the backup data stored in the secondary storage device.

9. As for claims 2 and 4, it is inherent that one of the purposes for a backup storage system such as Kern et al.'s system is to overcome hardware failure of the first storage device by backing up data to the second and third storage devices. It would have been obvious to one ordinarily skilled in the art at the time of the applicant's invention that if the hard disk drive forming the first storage device and the hard disk drives forming the second and third storage devices are not physically separate hard disk drives (in other words, they are the same hard disk drive), then hardware failure at the first storage device would also mean the failure of the second and third storage devices as well, which would destroy one of the main purposes for Kern et al's system.

10. As for claim 3, Kern et al. substantially discloses, in further view of Cheston et al., the second write unit as described above. As for the predetermined time being stored in the said memory, since the System Data Mover which performs the functionalities of the second write unit is stored in the said memory as described above, it would have been obvious to one ordinarily skilled in the art at the time of the applicant's invention that storing the predetermined time on the same memory with the System Data Mover would provide faster access and operation time than storing the predetermined time elsewhere.

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kern et al., further in view of Cheston et al. and Burton et al. [US 6,526,419 B1].

12. As for claim 18, Kern et al. substantially discloses, in further view of Cheston et al., the disk control apparatus described above, with the understanding that the channel

control unit and the disk control unit referred to in claim 18 are the same entities as the write request reception unit and the first write unit in claim 1, respectively.

Although a switching control unit is not taught by Kern et al. in further view of Cheston et al., Burton et al. teaches a backup storage system where a switch (Figure 1, Switch 8) is used to provide communication among more than two devices (Column 3, Lines 12-14). Since providing communication among more than two devices using a switch is less costly and results in less design complexity than providing a dedicated link between every pair of devices that require communication, it is therefore obvious to one ordinarily skilled in the art at the time of the applicant's invention that the disk control apparatus disclosed by Kern et al. in further view of Cheston et al., can reduce cost and complexity by using a switching means to provide communication for the said channel control unit, said disk control unit, and the shared memory.

Allowable Subject Matter

13. Claims 5-10 and 12-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. The prior arts made of record and not relied upon are considered pertinent to applicant's disclosure.

Patent No:

US 6,898,681 B2	Computer Storage Systems
US 6,820,180 B2	Apparatus and Method of Cascading Backup Logical Volume Mirrors
US 2004/0034752 A1	Method and System for Mirroring and Archiving Mass Storage
US 6,925,531 B2	Multi-Element Storage Array

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shawn Gu whose telephone number is (571) 272-0703. The examiner can normally be reached on 9am-5pm, Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (571)272-4210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S.G.

Shawn X Gu

Assistant Examiner
Art Unit 2189

10 August 2005

GARY PORTKA
PRIMARY EXAMINER